WEATHER, FORECASTS, AND WARNINGS.

By H. C. FRANKENFIELD, Professor of Meteorology.

NORTHERN HEMISPHERE PRESSURE.

Honolulu.—Pressure was decidedly high for the month, there being only a few days when it was below normal. Relatively low pressure occurred on the 4th–5th, 11th, 14th–15th, 19th–20th, 25th–26th, and on the 30th; high pressure occurred on the 3d, 6th, 8th–9th, 12th–13th, 24th, and 28th. Under date of March 6, a clipping appearing in one of the Victoria, British Columbia, papers gave a report from the steamer *Makura* to the effect that severe hurricanes had occurred in the Fiji and Caledonia Islands, a number of lives and many vessels being lost.

Alaska.—Pressure was generally high over this area for the month. Lows occurred about the 2d–3d, 8th, 15th, 17th, 21st, 26th–27th, and 30th–31st; and highs on the 4th–5th, 6th–7th, 11th–12th, 18th–19th, 24th, and 28th–29th.

Azores.—Pressure for the month was decidedly high, there being only three days on which pressure was below the seasonal average. Relatively low pressure occurred on the 3d–4th, 7th–8th, 10th, 18th, 24th–25th; and highs on the 2d–3d, 6th, 8th–9th, 12th–14th, 19th–20th, and 27th.

Iceland.—Pressure averaged below normal for the month. Lows occurred on the 2d, 4th–5th, 12th, 14th, 16th, 18th–19th, 25th–26th, and 28th–29th; and highs on the 8th, 23d, and last day of the month.

Siberia.—Pressure averaged above the normal for the month. Lows occurred about the 3d, 7th, 12th, 15th, 17th–18th, 24th, 27th, and 30th–31st; and highs about the 5th, 10th, 14th, 19th, 25th–26th, and 28th–29th.

In the United States for the month as a whole temperatures were decidedly below normal over almost the entire country, Florida being the only State in which temperatures were above the average.

The month opened with temperatures generally below the seasonal average throughout the country, except in the middle and southern plateau and south Pacific coast districts. There was a low pressure area over southern Nevada of moderate intensity, and a high pressure area of great magnitude over North Dakota and Saskatchewan, extending southeastward into the middle Mississippi Valley. By the morning of the 2d the high pressure area was central over northwestern Minnesota and light frosts were reported in Georgia and southern South Carolina. By the 3d the high was north of Lake Huron, and during the next 48 hours remained practically stationary. On the morning of the 6th, it was over New England, causing the lowest temperatures for the month of March in 25 years in that section. During the next 24 hours it passed to Nova Scotia. On the 2d frost warnings were issued for Washington, Oregon, and California, and frosts occurred as forecast. Warnings were again disseminated for Washington, Oregon, and Idaho on the 3d, and frosts occurred early the next morning at a number of stations in those States. Frost warnings were successfully issued on the 4th and 5th for portions of the north Pacific States.

The following weekly forecast was issued Sunday, March 3:

The general distribution of atmospheric pressure over the Northern Hemisphere is such as to indicate that there will be no cold wave to cross the country during the coming week, and that there will be a general, though gradual reaction to normal temperatures over the region east of the Rocky Mountains Tuesday and Wednesday, and moderate temperatures will prevail thereafter until the close of the week. A disturbance that now covers the West and Southwest will advance slowly eastward and cause a continuation of unsettled weather with rains in southern and snow and rain in middle and northern States east of the Rocky Mountains during the next several days. The next disturbance to cross the country will appear in the far West Thursday, or Friday and prevail over the Middle West at the end of the week.

Moderate weather and wind conditions will prevail over the trans-Atlantic steamship routes the coming week.

The center of the low that was over Nevada at the beginning of the month remained practically stationary during the following 24 hours, although pressure fell over the southern slope of the Rocky Mountains. Pressure over the southern plateau and California remained low until the 7th and abundant and much-needed rains occurred over California. By the morning of the 4th the low center was over western Colorado, while there was evidence of a disturbance over southern Texas. Precipitation was reported on the morning of the 2d from the Rocky Mountains to the Mississippi River and continued over that region until the 3d, having spread in the meantime to the Ohio Valley and the east Gulf States. Heavy snows were reported in Kansas and Missouri.

On the morning of the 4th precipitation was reported over the Atlantic States from Pennsylvania southward in connection with an unsettled condition near Cape Hatteras. There was no evidence of the Texas low, before referred to, on the morning of the 4th, but on the 5th a center of relatively low pressure was over Louisiana, attended by precipitation over the Gulf, southern Plains States, and the lower Ohio Valley. By the morning of the 6th the disturbance was off the South Carolina coast and precipitation had spread over the Atlantic States as far north as Pennsylvania. By the morning of the 7th the storm had passed to a position off the middle Atlantic coast and the rain area had spread to southern New England. By the following morning the storm had passed from the region of observations.

On the morning of the 4th a high-pressure area was central over southern Saskatchewan and by the following morning it had passed to southern Minnesota. It apparently joined with the high pressure area that was central on the morning of the 5th over Lake Huron and which by the morning of the 6th was over New England. This high caused changes to colder weather throughout the Rocky Mountain districts and over the Gulf States and New England.

On the evening of the 7th there was an unsettled condition extending from the Ohio Valley to Texas, and by the morning of the 8th a low center was over Ohio and another illy defined center was over northern Mississippi. By the morning of the 9th the northern center had passed to northern New England, while the southern one was

over eastern Virginia. The northern storm decreased in intensity, while the Virginia center of low pressure deepened and moved northeastward, and by the following morning was central south of Nova Scotia, and by the morning of the 11th it was over Newfoundland. Precipitation attending this storm was quite general from the eastern slope of the Rocky Mountains eastward to the Atlantic coast.

On the morning of the 6th a high-pressure area appeared over northern Alberta and by the following morning it was over southern Saskatchewan. By the morning of the 8th it was over western South Dakota with temperatures 10° or more below zero near its center. By the morning of the 9th it was over Kansas, carrying the line of zero temperature to the northwestern portion of that State. By the morning of the 10th it had advanced to southern Indiana with decreased intensity. On the morning of the 11th the high-pressure area was over Delaware and during the day passed off the coast. This high caused decided falls in temperature over the country from the Rocky Mountains eastward to the Atlantic seaboard from the 9th to 10th.

On the 8th frost warnings were issued for the north Pacific coast States and occurred as indicated in the warnings. Warnings for frost were again issued on the 9th, and frosts occurred on the morning of the 10th, although a little more severe than anticipated.

The following weekly forecast was issued Sunday, March 10:

The weather chart of the Northern Hemisphere of this date shows marked atmospheric disturbances over the North Atlantic Ocean, eastern Siberia, and the western coast of the United States, and areas of abnormally high barometric pressure and cold weather over the interior of Asia and the eastern half of the United States.

A disturbance that now covers the Pacific slope will advance slowly eastward, preceded and attended by general rains in southern and probably snows in northern districts, and cross the Middle West about Tuesday and the eastern States Wednesday or Thursday. It will be preceded by a general rise in temperature over much of the country east of the Rocky Mountains during the first part of the week, and it will be followed by a change to colder weather which will make its appearance in the Northwest Tuesday and Wednesday. Following this storm the next disturbance to cross the country will appear in the Northwest Thursday or Friday and prevail over the Middle West at the close of the week.

It is probable that stormy weather will prevail over the trans-Atlantic steamship routes east of the Grand Banks during the coming week.

During the 9th a storm passed inland over the south Pacific coast. Storm warnings were issued during the afternoon of that date for the southern California coast and severe gales were experienced over that region, causing considerable damage. Storm warnings were repeated for the southern California coast on the 10th and also ordered for the northern California coast, and high winds occurred as indicated in the warnings. Precipitation, of which there was great need, was well distributed over the State of California. By the morning of the 10th, the storm was over southern California and by the following morning over Kansas. On the morning of the 11th storm warnings were issued for the east Gulf coast and on the 12th for the Atlantic coast, and brisk to high winds occurred over sections indicated in the warnings, the storm being particularly severe in the vicinity of Pensacola, Fla. By the morning of the 12th there were two centers, one over western Tennessee and the other over Georgia. During the 12th, the northern center decreased in intensity and lost its identity, while the southern storm increased in energy and moved northeastward up the coast, being central on the morning of the 13th over Long Island Sound. By the morning of the 14th it was over the Canadian Maritime Provinces. Rains attending this storm were quite general over central and southern districts and a reaction to temperatures about normal attended its passage.

On the morning of the 11th a high pressure area of slight intensity appeared over Saskatchewan. Warnings of frost were issued for Washington, Oregon, and Idaho, and frosts occurred during the early morning of the following day. By the morning of the 12th the high area was over the Plains States, and on the morning following over the Middle Gulf States, causing frosts quite generally over the West Gulf States, warnings of which had been previously issued. The high area passed thence to Virginia by the morning of the 14th and during the 12 hours following passed off the coast. Changes to colder weather occurred during its passage over the region from the Rocky Mountains to the Great Central Valley.

On the morning of the 12th a storm was off the middle Pacific coast and by the morning of the 13th it had advanced to Utah. By the morning of the 14th there were two low centers, one over Kansas and the other over southern Texas. The southern Texas low disappeared from the map and the northern one passed to the upper Ohio Valley by the morning of the 15th. By the evening of that date it was over northern New York and by the morning of the 16th it had moved to the Canadian Maritime Provinces. This disturbance caused precipitation from California eastward over the southern half of the country to the Mississippi River and east of the Mississippi precipitation was quite general. Heavy snows were reported in Montana, Colorado, Kansas, Nebraska, and Iowa, and rainfall was heavy over Tennessee and the southern Appalachian region. Severe local storms were reported in portions of the South Atlantic States and in Alabama, together with a great deal of damage to property. Changes to temperatures above normal preceded and attended the passage of this storm center across the country. On the 14th storm warnings were ordered for the Gulf and south Atlantic coasts and on the 15th for the middle and north Atlantic coasts. High winds occurred as forecast during the 15th and severe gales occurred over Atlantic coast districts.

A high-pressure area that was central over the northern slope of the Rocky Mountains during the 13th and 14th moved to the southern Slope States by the morning of the 15th. It passed thence to the Ohio Valley by the following morning, causing frosts in the Gulf States, forecasts for which had been previously issued. By the morning of the 17th the high pressure area was central over New England with greatly increased intensity. Frosts were reported in portions of the Middle Atlantic States, and changes to colder weather were experienced over the entire country from the Rocky Mountains eastward.

The following weekly forecast was issued Sunday, March 17:

The distribution of atmospheric pressure over the North American continent and the adjacent oceans is such as to indicate generally fair weather with mild temperature during the next several days in the Eastern and Southern States and the first part of the week in the Middle West. The pressure will remain relatively low with unsettled weather the next two days in the Northwestern States and on the north Pacific coast and a well-defined disturbance will overspread these regions about Tuesday or Wednesday, whence it will move eastward and cross the Great Central Valleys Wednesday night or Thursday and the Eastern States Thursday or Friday. This disturbance will be attended by local rains and snows in northern and showers and thunderstorms in southern districts and will be followed by a change to considerably colder weather, which will make its appearance in the Northwest about Wednesday.

On the 14th storm warnings were ordered for the north Pacific coast and storm winds occurred as forecast during the next 36 hours, in connection with a storm that was central over the State of Washington on the evening of the 15th. During the next 12 hours it passed to the northern Plateau region, and by the morning of the 17th was over Minnesota. Thus far in its course it had caused precipitation in Pacific Coast States, the northern Plateau, and northern portion of the Plains States. By the morning of the 18th it had passed to eastern Quebec and by the following morning was over the Grand Banks. Precipitation occurred during the 16th and 17th over the Upper Lake Region, and changes to warmer weather were quite general. Pressure remained low for several days over the north Pacific coast after the passage of the storm before referred to, and storm warnings were ordered on the 17th and high winds occurred within the 24 hours following over that district.

A tongue of low pressure appeared over the Canadian Northwest on the 17th and on the following morning the low, with an axis east and west, had settled to the southward. On the morning of the 19th there were 3 centers of low pressure—one over Lake Superior, one over Kansas, and another over Utah. There was also a high area over Saskatchewan accompanied by temperatures more than 20° below zero near its center. By the morning of the 20th the Lake Superior storm had passed to New Brunswick, while the Kansas low was illy-defined over Virginia in the trough of the first-mentioned low. The Utah low remained practically stationary and increased in intensity, and an off-shoot from it was over New Mexico on the morning of the 20th, while the Canadian high pressure was central over northern Minnesota with an axis east-west. On the morning of the 20th storm warnings were issued for the Texas coast and high winds occurred during the succeeding 12 hours. By the morning of the 21st the eastern low had passed northeastward off the coast. Little precipitation occurred in connection with this storm, except in the Upper Ohio Valley and New England. The New Mexico low advanced rapidly northeastward and was central on the morning of the 21st in the Upper Ohio Valley. The Minnesota high-pressure area divided and on the morning of the 21st one center was over northeastern Ontario and the other over the middle slope of the Rocky Mountains. Decided changes to colder weather were experienced in the west Gulf States, of which changes interests affected had timely notice.

The following extract, taken from a clipping that appeared in the Iola Daily Register of Iola, Kans., dated March 21, 1912, refers to the cold-wave warnings issued during the winter for that section:

> The number of cold waves which have visited this section during the past winter has been remarkable, and little less remarkable is the almost unerring accuracy with which the Weather Bureau has foretold their arrival.

On the morning of the 22d the Upper Ohio Valley storm had passed off the Atlantic coast, while the Ontario high-pressure area had passed from the region of observation, probably northeastward into Canada, causing changes to colder weather over northern districts from the upper Lakes eastward. In connection with the low just referred to, precipitation was quite general in middle districts from the Rocky Mountains eastward and in the lower Lake region and New England. The western area of high pressure on the morning of the 22d was central over Iowa and the area of colder weather had spread to the Ohio Valley. By the morning of the 23d the Iowa high-pressure area was over eastern Pennsylvania and during the day passed off the coast. The changes to lower temperature in the East were confined chiefly to the South Atlantic States.

The following weekly forecast was issued Sunday, March 24:

> The distribution of barometric pressure over the North American Continent and the adjacent oceans is such as to indicate generally fair weather with temperatures near or slightly below the seasonal average during the next several days over the greater part of the United States. Rain or snow is probable, however, Monday in the North Atlantic States and the extreme Upper Ohio Valley. The next disturbance of importance to cross the country will appear in the far West Tuesday or Wednesday, cross the Middle West Wednesday or Thursday, and the Atlantic States near the close of the week; this disturbance will be preceded and attended by a general rise in temperature and local rains in southern and rains and snows in northern States and be followed by considerably colder weather, which will appear in the Northwestern States Thursday or Friday.

On the morning of the 23d a disturbance of slight intensity was central over eastern Texas and during the next 24 hours it had advanced to the Ohio Valley. A severe local storm occured during the afternoon of the 24th near Forrest City, Ark., and others occurred during the evening near Bond and Newton, Miss. By the morning of the 25th, the storm center was over the Canadian Maritime Provinces. Precipitation occurred generally throughout the eastern half of the country, being heavy over a belt extending from eastern Texas northeastward through the Ohio Valley. Attending the passage of this storm rises in temperature occurred throughout the East, and brisk to high winds were reported on the Gulf and Atlantic coasts, timely warnings of which were issued.

A high-pressure area was central over the northern Plains States on the morning of the 23d, and by the following morning it had settled southward, one center being over the southern Plains States and another over the Texas Panhandle. During the next 24 hours the northern center moved to the Michigan Peninsula, while the southern high center was over Louisiana. On the morning of the 26th one center was over the middle Atlantic coast and the other over northwestern Georgia. On the mornings of the 25th and 26th frosts were reported in the Gulf States and changes to colder weather occurred, warnings of which were previously disseminated.

A storm that was over Nevada on the morning of the 24th remained practically stationary during the following 36 hours, and by the morning of the 26th it had passed to northern Arizona. By the morning of the 27th it was over western Texas and by the following morning was over Arkansas. On the morning of the 29th the storm was over the upper Ohio Valley with greatly increased intensity, and in connection therewith a severe local storm occurred near Riverside, Ala., during the evening of the 28th. During the next 24 hours the storm moved rapidly northeastward and was central on the morning of the 30th east of Nova Scotia and passed thence over the north Atlantic steamship routes. Brisk to high winds occurred on the Gulf and Atlantic coasts, warnings of which were distributed previously to their occurrence. Precipitation was general from the Mississippi Valley eastward, being heavy in the Ohio and middle Mississippi Valleys, the Gulf and Atlantic Coast States.

A high-pressure area that was central on the morning of the 29th over western Ontario moved to Lake Huron by the morning of the 30th. During the next 36 hours it advanced southward to the South Atlantic States, where it was central at the end of the month.

On the evening of the 28th a low-pressure area was central over southern Alberta, with a trough extending southward to northern Utah. By the evening of the 29th the center that was over Alberta had decreased in intensity and was central over the Plains States, while in the trough that was over northern Utah on the evening of the 28th there developed a low of marked intensity. By the evening of the 30th the northern storm had moved northeastward to western Ontario, while the southern storm was over New Mexico and by the following evening was over western Texas.

From the morning of the 29th to the evening of the 30th a high-pressure area moved from Alberta to Lake Superior, causing decided falls in temperature over the Rocky Mountain region, the Plains States, and the upper Lake region, warnings of which were issued previously.

The following weekly forecast was issued Sunday, March 31:

The distribution of atmospheric pressure over the North American Continent and the adjacent oceans is such as to indicate temperatures near the seasonal average over the greater part of the country the coming week. During Monday and Tuesday there will be a change to cooler weather in northern and middle States from the Mississippi Valley eastward, but it will be of short duration and will be quickly followed by rising temperature. The next change to colder weather will appear in the Northwest about Thursday or Friday. The precipitation during the week will probably be much less than has occurred in any one of the preceding three weeks. A depression that now covers the Southwest will likely cause local rains the first part of the week in the Southern States, and a disturbance that now prevails over Alaska will enter the Northwestern States about Tuesday, cross the Middle West Wednesday or Thursday and the Eastern States about Friday; it will be attended by a short period of local rains over the Rocky Mountain region and the districts east thereof.

The month closed with temperatures 10° to 20° above normal in the Northwest and they were also above in the Atlantic States, while from the upper Lakes to the Southern Plateau temperatures were below the seasonal average.

The following extract from the Jacksonville (Fla.) Times-Union of March 25 indicates the interest felt throughout the great crop districts in the weekly forecasts of the Weather Bureau. The information is from New Orleans, La., and dated March 24:

The weather reports from the cotton belt promise to be unfavorable because of so much rain. The general feeling is that the present long period of unsettled weather must be followed by a spell of fair weather, and the long-distance weather forecast will be eagerly looked for, and especially so because the last few weeks these weekly forecasts have been correct in the main.

NOTES ON THE WEATHER IN ALASKA FOR FEBRUARY, 1912.

By ARTHUR GIBSON, Special Observer.

On April 10, 1907, I cut holes in the ice in Bering Sea opposite the life-saving station at Nome, Alaska, 225, 700, and 1,200 feet, respectively, from the shore line and measured the thickness of the ice, depth of water from the top of the ice, and the temperature of the water at the sea bottom. This I repeated to-day, February 10, 1912, and the comparative results are as follows:

	Apr. 10, 1907.			Feb. 10, 1912.		
	Ice.	Water.	Temperature.	Ice.	Water.	Temperature.
	Feet.	*Feet.*	°*F.*	*Feet.*	*Feet.*	°*F.*
225 feet	4.75	5.25	29	2.50	7.25	31
700 feet	4.10	8.25	28	3.50	7.60	30
1,200 feet	4.50	12.00	27	2.50	11.20	29

The holes were cut in the identical same places, the sand bar at 225 feet having changed a little seaward; about 1 foot wind-drove ice on top of solid ice at 700 feet on February 12, 1912; depth of water will vary slightly by tide, thermometer in both instances secured from United States life-saving station at Nome, Alaska, and checked with my Weather Bureau thermometers and found correct.

The reason for the temperature decreasing seaward is that the water is nearly fresh along the shore under the ice where no currents mix it with the sea water.

Up to 2 weeks ago no Arctic or pack ice had been sighted at either Point Hope or Cape Prince of Wales, and at the latter place all shore ice had disappeared about 10 days ago. The solid ice at Nome extends seaward about 2 miles, beyond which the ice is more or less broken up and moving with the tide and wind.

Through the courtesy of the United States wireless stations I am receiving the daily weather reports from Dutch Harbor and St. Paul Islands, and they report: "Sea clear of ice."

I have written the missionary at Wales to kindly keep a daily log, or record, of the direction and approximate velocity of the current through Bering Straits from this on, as well as circumstances may permit, and any records thus derived will be forwarded direct to the central office.

Average temperatures and departures from the normal.

Districts.	Number of stations.	Average temperatures for the current month.	Departures for the current month.	Accumulated departures since Jan. 1.	Average departures since Jan. 1.
New England	12	31.4	− 1.5	−10.5	−3.5
Middle Atlantic	15	38.3	− 1.5	−12.2	−4.1
South Atlantic	10	53.4	− 0.4	− 9.3	−3.1
Florida Peninsula [1]	9	68.1	+ 1.4	− 3.9	−1.3
East Gulf	11	55.2	− 2.1	−10.7	−3.6
West Gulf	11	52.0	− 5.9	−13.4	−4.5
Ohio Valley and Tennessee	14	39.8	− 4.2	−19.0	−6.3
Lower Lakes	11	27.1	− 5.8	−21.0	−7.0
Upper Lakes	13	21.8	− 5.7	−24.4	−8.1
North Dakota [1]	9	15.7	− 5.1	−10.7	−3.6
Upper Mississippi Valley	14	28.6	− 7.4	−24.4	−8.1
Missouri Valley	12	28.6	− 7.5	−16.7	−5.6
Northern slope	10	20.6	−10.4	− 8.0	−2.7
Middle slope	6	32.5	−10.0	−15.1	−5.0
Southern slope [1]	8	46.3	− 6.4	−11.7	−3.9
Southern Plateau [1]	10	49.0	− 2.2	− 1.1	−0.4
Middle Plateau [1]	10	36.4	− 1.9	+ 4.6	+1.5
Northern Plateau [1]	10	35.7	− 2.5	+ 0.7	+0.2
North Pacific	7	43.9	− 0.3	+ 6.6	+2.2
Middle Pacific	7	49.4	− 1.9	+ 2.6	+0.9
South Pacific	4	53.3	− 1.8	+ 5.4	+1.8

[1] Regular Weather Bureau and selected cooperative stations.